CLINICAL STUDY

Influence of Primary Intimal Tear Location in Type B Aortic Dissection as a Factor Portending Retrograde Type A Aortic Dissection after Endovascular Repair

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ABSTRACT

Purpose: To investigate the effect of a primary intimal tear's position on the distal convexity as a factor predisposing patients to developing a retrograde type A aortic dissection (RTAAD) after endovascular repair for type B aortic dissections.

Materials and Methods: From January 2010 to December 2015, 334 patients with type B aortic dissections identified from a retrospective thoracic endovascular repair database were assigned to 2 groups based on the location of primary intimal tears in the distal aortic arch. Other potential risk factors were analyzed, and Kaplan-Meier survival curves were constructed.

Results: The location of the primary intimal tear was identified in 230 patients (68.9%) in the convexity group and in 104 patients (31.1%) in the concavity group. After intervention, 20 patients (convexity: 7.8%, concavity: 1.9%) developed an RTAAD. Univariate analysis identified that the location of the primary intimal tears ($P = .053$), the areas involved by dissection ($P = < .001$), and the covering of the brachiocephalic trunk ($P = .024$) were significantly associated with RTAAD. Multivariate analysis revealed that a primary entry tear at the distal convexity might be a predictor for developing RTAAD ($P = .053$), with a relative risk of 4.243 (95% confidence interval, 0.984–18.286).

Conclusions: Patients with primary intimal tears located in the distal convexity may be more likely to develop RTAAD than patients with primary intimal tears in the distal concavity.

ABBREVIATIONS

CI = confidence interval, IRAD = International Registry of Aortic Dissection, QR = quartile range, RTAAD = retrograde type A aortic dissection, TBAD = type B aortic dissection, TEVAR = thoracic endovascular aortic repair

Thoracic endovascular aortic repair (TEVAR) is performed to treat a Stanford type B aortic dissection (TBAD). The purpose of using the TEVAR technique in treating TBAD is to cover the proximal primary intimal entry tear and prevent lesion progression by using a stent graft. Results from the recent series of studies on this technique are encouraging and demonstrate high rates of technical success (1–3). Additionally, several studies demonstrated that TEVAR has a high rate of false lumen thrombosis and induced favorable aortic remodeling, with delayed disease progression and improved survival rates (4,5).

Despite TEVAR's advantages, associated risks make endovascular repair a source of concern, including paraplegia, stroke, stent migration, neurologic deficits, and retrograde type A aortic dissection (RTAAD). RTAAD is an uncommon but lethal postoperative complication, with an incidence rate ranging between 1.3% and 6.8% (6–10) and a high mortality rate between 33% and 57% (6,10–12). RTAAD may occur during an operation or hospitalization as well as after discharge (6,8,10), and the precise mechanism behind the occurrence of RTAAD remains unclear. Several reports have attributed the occurrence of this lethal complication to patient-specific or procedural factors (10,13,14). In previous studies, the location of the primary intimal tear in TBADs was found to be a predictor of

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None of the authors have identified a conflict of interest.

Appendix A and Tables E1–E3 are available online at *www.jvir.org*.

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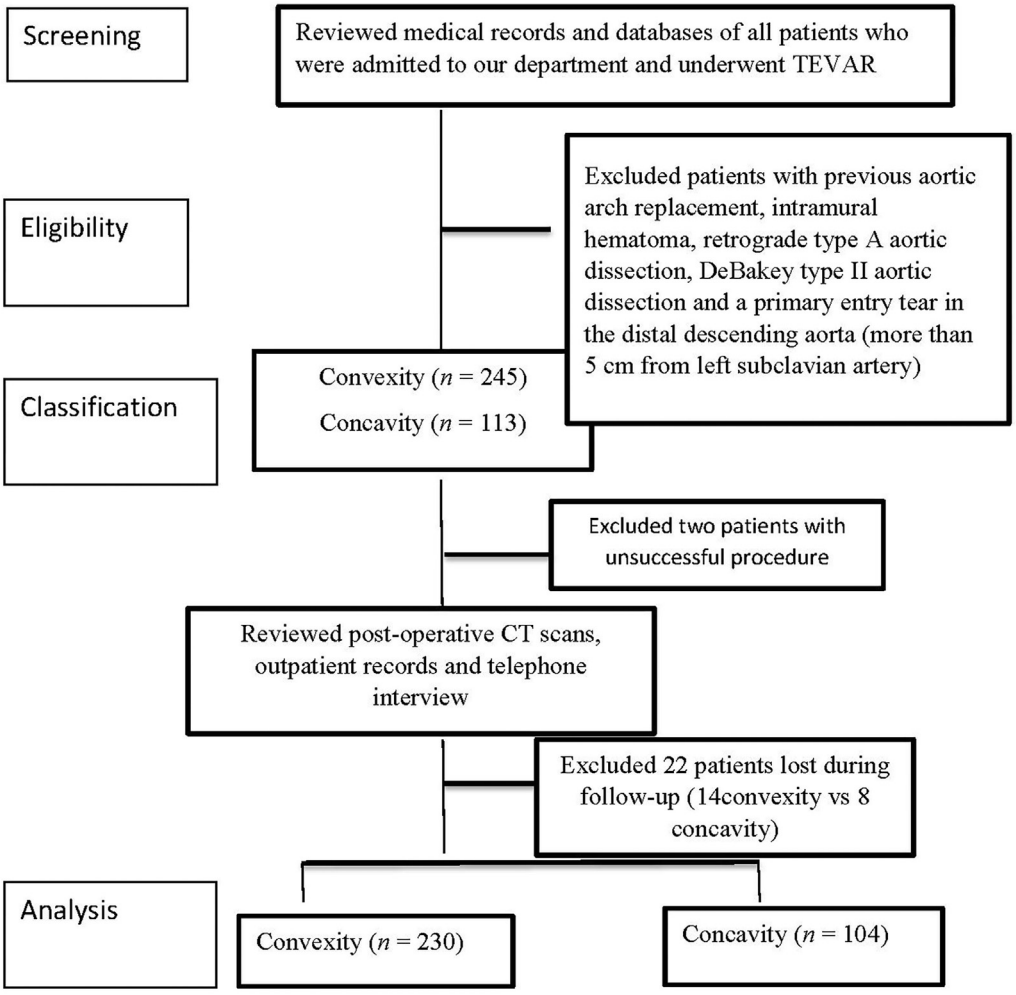

Figure 1. Flow chart for study screening, patient selection, and evaluation

developing a primary or secondary complication; however, a few reports have found some evidence of a relationship between the development of primary intimal tears located on the distal aortic concavity and complications during follow-up (15,16).

The hypothesis of this study was that an intimal tear's position on the greater aortic curvature is a predisposing factor for developing RTAAD after TEVAR.

MATERIALS AND METHODS

Patient Demographics

Data collection and analysis for this study were approved by the Ethics Committee of The First Affiliated Hospital of Zhejiang University School of Medicine, China. Informed consent was obtained from all patients. The study was retrospective and included consecutive patients between January 1, 2010, and December 31, 2015. The medical records and databases of all patients who were admitted to our department and underwent TEVAR were reviewed. The exclusion criteria are summarized in the flow chart presented in **Figure 1**.

Patients were assigned to 2 groups according to the location of their intimal tears on the distal aortic curvature, using axial computed tomography (CT). The term convexity refers to a primary intimal tear at the upper circumference (180°); the term concavity refers to a primary intimal tear at the lower circumference (16). The exact locations of the primary intimal tears were confirmed with CT angiography and preoperative angiographic source data.

Preoperative Examination

All patients agreed to CT angiography with 3-dimensional reconstruction, allowing for an evaluation of the extent of the dissection and the intimal tear's position on the aortic curvature, as well as an assessment of the feasibility of performing endovascular repair.

Device Details

Stent graft selection was affected by medical insurance rules, the patient's economic situation, and the preference of the patient's surgeons. In total, 7 commercial devices were implemented in 334 patients. TEVAR was performed using the following stent grafts: Valiant (Medtronic Cardiovascular, Santa Rosa, California), TAG (W. L. Gore and